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Household Food Security and Nutritional Status of Under-Five-Year Children: A Case Study of Nepal

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ABSTRACT

Background: Food security refers to accessing to desirable, nutritious, and healthy foods to live a healthy and productive life. Household food insecurity is an underlying cause of malnutrition in children. In this study, the household food security and its influence on the nutritional status of under-five year children were investigated. **Methods:** A cross-sectional analytical study was conducted from August to November 2019 in Syangja district of Nepal. Of six rural municipalities of the district, Phedikhola Rural Municipality was selected using the lottery method. We found 905 eligible households that have an under-five year child. A total of 289 children entered the study after considering the 40% overall prevalence rate of malnutrition among children under five years of age. Data were collected proportionately from each ward considering the health status and anthropometric measurements of children and household food security using a structured interview schedule and the Household Food Insecurity Access Scale. Descriptive statistics and chi-square tests were applied to assess the situation and determine the association. **Results:** Food insecurity was observed in more than half (52.3%) of the households. Food insecurity was associated ($P < 0.001$) with the socioeconomic status of the family. Prevalence of stunting (height-for-age), underweight, and wasting (weight-for-height) in children were 28.7%, 20.0%, and 13.9%, respectively. Food security, exclusive breastfeeding, and initiation time of complementary feeding were significantly associated with wasting and underweight ($P < 0.05$). **Conclusion:** Food insecurity and under-five year malnutrition were highly frequent in the study areas. The improvement of educational, occupational, and economic conditions of the households may be a solution to this problem.

Keywords: *Food security; Food insecurity; Under-five children; Malnutrition*

Introduction

Household food security refers to the physical, social, and economic access to adequate, desirable, and healthy food required to live an active life (Grainger, 2010). Adequacy and quality of food are regarded as a prerequisite of food security that may meet the nutritional requirements for the development of human beings. Inadequate and unhealthy food may affect

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health of the entire population. However, growing age children are a vulnerable food insecurity group due to their rapid psychological changes, daily requirements, and insufficient food intake that may lead them to malnutrition (Fanzo *et al.*, 2018, Yadav *et al.*, 2014).

Food insecurity and malnutrition is a common problem in rural areas of developing and least developed countries (Blössner *et al.*, 2005, World Health Organisation, 2018). Globally, the prevalence of household food insecurity increased from 8.4% to 10.2% between the years 2015 and 2017. In Asia and South-east Asia, household food insecurity has been increasing from 6.6% to 6.9% between the years 2015 and 2017 and from 6.6% to 10.1% between the years 2015 and 2017, respectively. Globally, 150.8 million under-five year children were stunted, 50.5 million were wasted, and 38.3 million were overweight. Nearly, 90% of children from Asia and Africa are stunted (142.3 million) and wasted (48.8 million). Regionally, south Asia is home to 38.9% of the world's stunted children. Of all stunted children, nearly 40% live in South Asia, which has the highest-burden of malnutrition (Fanzo *et al.*, 2018, World Health Organisation, 2018). The prevalence of wasting in South Asia was above 15% threshold considered as a critical public health problem (Harding *et al.*, 2018).

In context of Nepal, 52% of the households are food insecure and urban households are more likely (54%) to be food secure than rural households (39%). In Gandaki province of Nepal, 44% of the households were food insecure. Of the total under-five-year children, nearly 11 million were malnourished, 36% stunted, 10% wasted, 27% underweight, and 1% were overweight (Nepal:. 2016). In the Syangja district, the overall prevalence of malnutrition among under-five-year old children was 40% (Central Beaurou of Stastics, 2012).

The nutritional status of children is determined by the household food security status. Food insecurity, inappropriate way of child feeding practices, gender of the child, maternal education, maternal dietary diversification and dietary choice, exclusively breastfed, complimentary food, immunization status, disease history, and family income were among the underlying causes of malnutrition (Abdullah *et al.*, 2018, Agbadi *et al.*, 2017, Blössner *et al.*, 2005, World Health Organisation, 2018). Prior studies showed that household food security was significantly associated with income, family type, family size, education status, and ethnicity (Osei *et al.*, 2010, Parajuli *et al.*, 2019). A study showed that the risk of food insecurity and malnutrition was high among under-five-year-old children in urban areas (Nepal:. 2016). Hence, this study aimed to assess household food security and its influence on nutritional status among children under five years of age.

Materials and Methods

Design and participants: A community-based cross-sectional study was conducted in Phedikhola Rural Municipality (RM) of Syangja district, Nepal from August to November 2019. The district and rural municipality were selected purposively. Of the total 1645 households, only 905 households had children under five years of age. We decided to involve a child from each household, which resulted in a total of 905 participants. The sample size of the study was calculated using the overall prevalence of malnutrition in under-five-year-old children (40%) of Syangja district (Central Beaurou of Stastics, 2012) by taking in to account the 95% confidence interval and 10% non-response rate. Consequently, 289 households having at least one under-five-year old child were selected as the final study sample size. Phedikhola Rural Municipality consists of five wards. All study participants were divided proportionately into each ward and individual participants were selected randomly applying the lottery method.

Measurements: The required data were collected using an interview schedule and taking the anthropometric measurements of the under-five children. The interview schedule consisted of demographic and socio-economic information of the households and children's information. The

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Household Food Insecurity Access Scale (HFIAS) was used for assessing the household food security status. We used stadiometers/measuring tapes and the weighing scales (India, salter type) to measure the height and weight of the children, respectively.

The study tools were translated into Nepali and back-translated to English for ensuring that it was understandable to the participants. The translated tools were pretested among 10% of the sample size in Aadhikhola Rural Municipality of the same district for enhancing the reliability and validity. During data collection, we identified the center of each ward with the help of Female Community Health Volunteers (FCHVs) and collected the data randomly. We continued visiting households in a clock-wise direction until obtaining the required number of children. After identifying the participants, we obtained verbal informed consents from the children's caregivers, interviewed them, and measured the anthropometric criteria of the children.

Operational definitions

Food secure: Households that did not experience any kind of food insecurity conditions and rarely worried about such conditions during the past one month.

Mild food-insecure: Households that worried about not having enough food sometimes/were unable to eat the preferred food/eat a more monotonous diet than the desired and/or some foods were considered undesirable but rarely. They did not cut back on quantity or experience any of the three most severe conditions as running out of food, going to bed hungry, or spending a whole day and night without eating.

Moderate food-insecure: Households that sacrificed quality more frequently by eating a monotonous diet or undesirable foods sometimes\had rarely or sometimes started to cut back on quality by reducing the size of meals or the number of meals.

Severe food-insecure: Households that experienced one of these three conditions: running out of food, going to bed hungry, or spending a whole day and night without eating even once in the last month.

Nutritional status: Stunting: The child whose Z-score (height-for-age) was greater/equal to -2 SD, -3 to -2 SD, and below -3 SD is categorized as normal, moderately stunted, and severely stunted respectively. Wasting: The child whose Z-score (height-for-age) was greater/equal to -2 SD, -3 to -2 SD, and below -3 SD is categorized as normal, moderately stunted, and severely stunted respectively. Underweight: The child whose Z-score (height-for-age) was greater/equal to -2 SD, -3 to -2 SD and below -3 SD is categorized as normal, moderately stunted, and severely stunted respectively.

Ethical considerations: The research proposal was reviewed and approved by the Institutional Review Committee, Pokhara University Kaski Nepal (Ref.-42/2076-77). We also took permission from Phedikhola Rural Municipality before conducting this study. The informed consent was also received from each participant for ensuring their voluntary participation.

Data analysis: The collected information was checked for its completeness and consistency after data collection and data entry, respectively. We performed descriptive statistics such as number, percentage, and mean with the standard deviation and bivariate analysis using chi-square and odds ratio. The level of significance was set at P-value < 0.05.

Results

Of the total 289 sample households, nearly half (47.80%) of them were food secure (**Figure 1**). Amongst various factors of the household food security type of family ($P < 0.05$), ethnicity ($P < 0.05$), and economic condition ($P < 0.05$) were significantly associated with food security.

Similarly, of the total 289 children under five years of age, 13.84%, 28.71%, and 20.295 were found wasted, stunted, and underweight (**Table 1**). The wasted condition of the children was significantly associated with exclusive breastfeeding ($P < 0.05$) and complimentary food ($P < 0.05$). Similarly, the under-weight condition of children was associated with the exclusive

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breastfeeding ($P < 0.05$), complimentary food ($P < 0.05$), and gender of the household head ($P < 0.05$). However, stunting condition of children had no association with these factors.

In the study area, food security had a significant association with wasting ($P < 0.05$) and under-weight ($P < 0.05$) conditions of the children. However, stunting condition of the children was not found significantly associated with household food security condition (**Table 1**).

Discussion

Of the total sample households, more than half of them experienced some degree of food insecurity in one year before the survey period. However, very few households reported severe food insecurity in the study area. This result was similar to the results of the studies conducted in Nepal, Brazil, and Western Ethiopia where food insecurity rates were 52 %, 47%, 56.1%, and 59.5%, respectively (Jemal *et al.*, 2016, Nepal:. 2016, Parajuli *et al.*, 2019, Santos and Gigante, 2013).

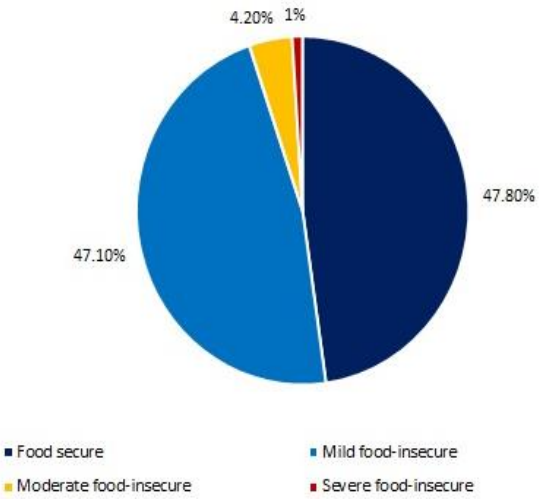

Figure 1. Food security at the household level

Table 1. Distribution of malnutrition in under-five-year old children in order gender and food security status.

Variables	Malnutrition conditions					
	Wasted		Stunted		Underweight	
	Yes	No	Yes	No	Yes	No
Gender						
Male	18 (11.05) [a]	145 (88.95)	47 (22.83)	116 (77.17)	36 (22.09)	127 (77.91)
Female	22 (17.46)	104 (82.54)	36 (28.57)	90 (71.43)	22 (17.46)	104 (82.54)
P-value[b]	0.12		0.96		0.33	
Food security						
Yes	11 (8.0)	127 (92.0)	37 (26.8)	101 (73.2)	21 (15.2)	117 (84.8)
No	29 (19.2	122 (80.8)	46 (30.5)	105 (69.6)	37 (24.5)	114 (75.5)
P-value	< 0.05		< 0.05		< 0.05	
Total	40 (13.84)	249 (86.16)	83 (28.71)	206 (71.28)	58 (20.29)	231 (79.72)

[a]: N (%); [b]: Chi-square test

A multinational study in Bangladesh, Vietnam, and Ethiopia showed high prevalence of household food insecurity as 32%, 40%, and 66% in Bangladesh, Vietnam, and Ethiopia, respectively (Ali *et al.*, 2013). Prior studies carried out in various countries showed that the prevalence of household food insecurity was 75.8%, 69%, 74.1%, and 81% in South-Ethiopia, Kailai district of Nepal, and Sekela district of Western Ethiopia, respectively, which was higher than the results of this study (Betebo *et al.*, 2017, Mulu and Mengistie, 2017, Osei *et al.*, 2010). Such variation may occur due to the differences in the study period, sample size, geographical condition, and socio-economic condition of the study areas.

This study revealed that the wealth index of households had a significant association with household food security status ($P < 0.001$). This finding is similar to the results of the studies carried out in Nepal and Bangladesh (Abdullah *et al.*, 2018, Parajuli *et al.*, 2019). We found that family type ($P = 0.015$) and ethnicity ($P < 0.001$)

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were significantly associated with the food security of the household, which is confirmed by the findings of a study carried out in the rural parts of Parbat and Kailali district of Nepal (Bhandari and Chhetri, 2013, Osei *et al.*, 2010, Parajuli *et al.*, 2019). This might be due to the similarities in socio-demographic and geographic characteristics of the study population.

In our sample, the prevalence of stunting, underweight, and wasting were 28.7%, 20.0%, and 13.9%, respectively. This finding coincides with the National Demographic Health Survey (2016) in Nepal, where the regional prevalence of stunting, wasting, and underweight was 36%, 10%, and 27%, respectively (Adhikari *et al.*, 2019, Nepal:. 2016). Another study conducted in Mohattari and Kapilvastu districts of Nepal showed that the prevalence of stunting, wasting, and underweight was high in comparison to the findings of this study (Bhandari and Chhetri, 2013, Yadav *et al.*, 2014). A study carried out in Ethiopia and Vietnam revealed that the prevalence of wasting was low, while the other two indicators were high in comparison to the results of this study. In both studies, the prevalence of household food insecurity status was higher in comparison to this study. However, the same study revealed that the prevalence of all forms of malnutrition was higher than the findings of this study (Ali *et al.*, 2013).

This study showed a significant association of household food insecurity with wasting and underweight. A study carried out in Bangladesh and Nepal showed similar results, whereas household food insecurity was significantly associated with stunting and wasting, but not with underweight (Abdullah *et al.*, 2018, Sreeramareddy *et al.*, 2015). Similarly, exclusive breastfeeding, initiation time of the complimentary food, and gender of the household head were significantly associated with malnutrition among under-five-year-old children. However, household food insecurity was not significantly associated with child malnutrition in Kailai district of Nepal (Osei *et al.*, 2010).

This population-based cross-sectional study was only based on quantitative reported information and anthropometric measurement of the children and household food security condition. We conducted this study using the minimum required sample size and a cross-sectional design. Childhood nutrition and food security conditions may determine various factors. Hence, it may require further interventional and qualitative studies for further precise assessment of the children's nutritional status and household food security.

Conclusions

Food insecurity and malnutrition among under-five-year-old children were found high in the study areas, where more than half of the households were facing food insecurity and nearly one-third of children were suffering from some sorts of malnutrition. The prevalence of malnutrition among under-five-year-old children was associated with exclusive breastfeeding, initiation time of complimentary food, and household food security status. The improvement of education, occupation, and economic condition of the family may be a solution to this problem.

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Authors' contributions

Paudel A was the principal investigator, prepared the first draft, contributed in the study design and data collection and performed the statistical analysis. Bhandari TR and Dangi NB reviewed and finalized the manuscript. All authors reviewed and approved the final manuscript.

Conflict of interest

The authors declare no competing interests.

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